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TITLE OF THE INVENTION

Method for the qualitative improvement of the products of the tobacco

CROSS-REFERENCE TO RELATED APPLICATIONS

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable

INCORPORATION-BY- REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC (See 37 CFR 1.52(e) (5) and MPEP 608.05. Computer program listings (37 CFR 1.96(c), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text are permitted to be submitted on compact discs). or "REFERENCE TO A MICROFICHE APPENDIX" (See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.)

Not Applicable

SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A ''Sequence Listing'' is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required ''Sequence Listing'' is not submitted as an electronic document on compact disc).

Not Applicable

FIELD OF THE INVENTION

The present invention refers to a method of which its implementation uses electronic and/or electromechanical technology, for processing the products of the tobacco, aiming at the beneficial modification of tobacco's physicochemical properties, so that, when the tobacco's products are used by the consumers, the produced chemical substances in gaseous and solid form of those products contain a smaller amount of free radicals, resulting in the reduction or even the elimination of the toxic and mutagenic effects of the tobacco's products on biological organisms.

BACKGROUND OF THE INVENTION

With the mass production of cigarettes following World War II, there was a large increase in the cases of lung cancer, mouth and pharyngeal cancer, cardiovascular diseases and, generally, serious and fatal diseases for the human organism. Soon, this fact was linked to the consumption of tobacco products and especially of cigarettes, which contain a large number of toxic chemical substances, both in the solid stage of tobacco and in its gaseous stage as well. In the former, solid stage and before its burning (use), tobacco contains substances which are directly toxic, like, for example, tar and nicotine. In the latter, gaseous stage and during its burning (use), more toxic substances are produced which are directly harmful to the human organism.

Cigarette smoke contains over 4,000 chemical compounds including 60 known carcinogens.

Nicotine is defined, by Dorland's Medical Dictionary, as a "very poisonous alkaloid obtained from tobacco," nicotine appears to be unsafe at any level. One drop—the amount contained in 145 cigarettes—can be fatal. Nicotine causes blood vessels to constrict, which in turn raises your blood pressure. Nicotine causes an increase of blood fats, including cholesterol. Nicotine is highly addictive. Recovering alcoholics and drug addicts have reported that quitting smoking is harder than kicking drinking or drugs.

Tar: the tar in tobacco smoke contains chemicals called polynuclear aromatic hydrocarbons that scientists have implicated in some 40 to 80 percent of all human cancers.

Acetaldehyde: a chemical substance that can cause disease is found in cigarettes and smog, acetaldehyde acts as a free radical. Free radicals disrupt the body's normal molecular functions, and can cause damage which scientists have linked to accelerated aging and a variety of deadly diseases.

Heavy Metals: lead, cadmium, radioactive polonium, and arsenic are just four of the poisonous heavy metals contained in cigarette smoke. These contribute to the suppression of the body's immune system and act as free radicals.

Carbon Monoxide and Nitrogen Oxide: these deadly gases destroy the ability of the blood to carry oxygen. They can oxidize blood fats and convert them into cancer-causing compounds.

In order to counter this problem of the toxic substances which are contained in and produced during the use of these products, various industrial products have been used in the last years, like, collection filters of tar and nicotine for one use or more uses, the common conventional cigarette filters, as well as, recently, the biological cigarette filters, which, until today, provide the maximum possible protection from the toxic substances of the solid and gaseous state of tobacco. In addition, attempts have been made with the use of additives (e.g. antioxidants) in order to block the effects of harmful carcinogens in tobacco.

In U.S. Pat. No. 5,909,736 Deliconstantinos George and Stavridis Ioannis teaches a method of withholding noxious compounds contained in cigarette smoke (NO, NOx, carcinogenic nitrosocompounds, free radicals, H_2 O_2, CO, aldehydes, and trace elements) which were up to today insufficiently retained by conventional cigarette filters. The method refers to the enrichment of common convention filters with biological substances of the metal ions (Fe^{2}+, Cu^{2}+, Mg^{2}+) complexed with porphirin ring as well as Fe^{2}+ ions stereospecifically bound to protein molecules, either separately or in combinations.

In U.S. Pat. No. 6,058,940 Lane Kerry Scott teaches a process and system for continuous assay and removal of toxins from tobacco. Products such as tobacco contaminated with mycotoxins, particularly aflatoxins, and benzpyrene and its precursors, are subjected to treatment with a solvent medium, to decontaminate the tobacco from the toxins.

In U.S. Pat. No. 5,803,081 O'Donnell, Jr.; Francis E. Williams; Jonnie R. teaches that, a significant increase on the temperature of tobacco, with microwave radiation, will lead in the reduction of carcinogenic nitrosamines, which are contained in the tobacco.

Also, in U.S. Pat. No. 6,135,121 Williams; Jonnie R. teaches that, a significant increase on temperature in the tobacco product, comprising cured non-green or yellow tobacco suitable for human consumption, with microwave radiation, will lead in the reduction of carcinogenic nitrosamines, which are contained in the product.

BRIEF SUMMARY OF THE INVENTION

This is the state of the art of today's technology. However, all these products attempt to limit the toxic action of the substances of the tobacco, by intervening during the smoking stage. Also the removal of specific toxins from tobacco with the help of solvents is a very expensive procedure and does not aim at the reduction of the toxicity of the substances of the tobacco (free radicals) that effect the users of tobacco's products.

Moreover, the reduction technique of carcinogenic nitrosamines with the heating procedure of the tobacco's mass doesn't solve the problem of toxicity reduction of the substances of the tobacco (free radicals).

Therefore, there is a need for a technology which would be able to act upon the same toxic substances of solid tobacco, restricting their toxic action, before and during the use of the product by the final consumer.

The aim of the present invention is to provide a solution to the above mentioned problem of the reduction of the harmful consequences of smoking, qualitatively improving the tobacco products.

The present invention constitutes a method which acts on solid tobacco before its use by the consumer and can be applied either during the industrial processing of tobacco and the production of its final products, or applied to the same final products (cigarette packs, cigars and tobacco pouches). The present invention acts on the existing toxic substances, and improves the quality of tobacco, so that the final product used by the consumer has fewer harmful consequences on his health. It constitutes a new original method for the qualitative improvement of the industrial products of tobacco.

The qualitative improvement is achieved with emission of electromagnetic energy towards the industrial products of the tobacco, and comes from a synthetic electromagnetic emission that occupies broader regions of frequencies of the electromagnetic spectrum from 30 Hz to 300 GHz, and is comprised by a specified and/or unspecified multitude of emissions of electromagnetic waves of dissimilar frequencies and is produced by electronic and/or electromechanical devices.

The method uses the resonance phenomenon with a periodic sequence in order to bring about the qualitative improvement of products of the tobacco. So the method achieves the beneficial modification of their physicochemical attributes achieving as a result, the reduction or even the elimination of the toxic and mutagenic effects of the tobacco's products on biological organisms.

The advantages of the present method are that it acts upon the same toxic substances of solid tobacco and limits their possibility to acquire attributes of free radicals (unpaired electrons) after the stage of their use (pyrolysis). So it limits their toxic action, so as to bring about a significant qualitative improvement of the industrial products of tobacco.

Moreover, an extremely serious advantage of this method is that the initiation of the improvement of the tobacco products is achieved with the initiation of the application of the method, while the desired application time of the method for the achievement of substantial improvement of the products is short, not more than a few hours.

Another advantage of this method is that it can be used for a wide industrial application and, moreover, it does not require change in the working specifications of the existent industrial or handicraft facilities, either during the processing stage of the tobacco or during the production stage of the final product (cigarette packs, cigars and tobacco pouches).

Another advantage of this method is that it is not applied only during the processing stage of the tobacco and the industrial manufacture of its final products, but it is also applied directly upon the final product, even after its

packaging or while it is placed in storage areas, and can also be used for household use.

Another advantage of the method is that, it is not necessary, neither for the tobacco products nor for the device to be stationary for the application of the method. Thus, the method can be applied inside ships or transportation containers, so that their qualitative improvement will have been achieved by the time they reach their destination.

Another advantage of this method is that, the application itself is financially expedient, as it requires very low operational cost.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

The invention is described below, with the help of non-restrictive examples and with reference to the attached drawing, which shows one application pattern of the method that constitutes the object of the present invention.

The drawing represents one application way of the invention, on tobacco products after the completion of the industrial process and on packaged tobacco products before their conveyance on the market.

One application way of the invention is described with reference to the drawing. The final industrial tobacco products (1) are placed packed in the storage areas or packed in pallets (2), at the customary storage temperature. Next to those products, an electromechanical or electronic device (3) of programmed operation, is placed, which produces a multitude of emissions of electromagnetic waves (6) of dissimilar frequencies. A coaxial cable extends from this device (4) which ends at the antenna of emission (5). The emissions of dissimilar electromagnetic wave frequencies (6) are emitted towards the final industrial tobacco products (1) or towards the packaged products in the pallets (2). The antenna of emission (5) may constitute an integral part of the device of emission (3) or be connected to the device directly with a coaxial cable (4).

DETAILED DESCRIPTION OF THE INVENTION

The application of the method uses source of electromagnetic energy, where this energy is dispatched to the space occupied by the mass of the products of tobacco. Electromagnetic energy comes from a synthetic electromagnetic emission that occupies broader regions of the frequencies of the electromagnetic spectrum from 30 Hz to 300 GHz, and is comprised by a specified and/or unspecified multitude of emissions of electromagnetic waves of dissimilar frequencies.

The synthetic emission is produced by electronic and/or electromechanical devices.

A main characteristic of operation of each emission of electromagnetic waves, of identified frequency, and/or synthetic emission as a total is that, is not characterized by a continuous time operation, but instead by an operation mode characterized by time interruption of operation and/or the change of their intensity until it becomes zero with any simple or composite form of pulsations.

The method uses the resonance phenomenon with a periodic sequence in order to bring about the qualitative improvement of products of the tobacco. So the method achieves the beneficial modification of their physicochemical attributes achieving as a result, the reduction or even the elimination of the toxic and mutagenic effects of the tobacco's products on biological organisms. The application of the method is using a plethora of emissions of dissimilar frequencies of electromagnetic waves and the emitted impulse excitation action of each defined emission of electromagnetic waves of specified frequency (for example, 100.000.000,0001 Hz or 100.000.000,0002 Hz or 100.000.000,0003 Hz e.t.c. of defined multitude of emissions of electromagnetic waves, i.e. digital sweep or multitude of non-defined emissions of electromagnetic waves, i.e. analogue sweep). So that it coincides suitably at regular or not regular time intervals the emitted action of impulse excitation, of each determined emission of electromagnetic waves from the multitude that is emitted, with every natural frequency of oscillation of each atomic and/or molecular and/or more macroscopic system of elements of tobacco products, so that they reach in resonance conditions i.e. of maximum energy absorption with the action of

impulse excitation of suitable frequency of electromagnetic waves, that emanates from the source of electromagnetic energy of the application of method.

Thus, it involves the equilibration and identification of all the atomic and/or molecular and/or more macroscopic systems of elements of tobacco products, so that the attributes of elements that tend to behave as free radicals is suspended.

The results of qualitative upgrade of products of tobacco are achieved with the particularity described by the method and are the time interruption and/or weakening of the impulse excitation action (compulsion force) of each defined emission of specified frequency of electromagnetic waves.

Therefore, during relaxation time, which occurs with the interruption of reciprocal resonance between forces of compulsion and the elements of products of tobacco, the elements will readjust itself to a new position of the chemical equilibrium. The readjustment is known as chemical relaxation.

Each emission of electromagnetic waves of specified frequency and also the synthetic emission as a total, which contains a multitude of emissions of electromagnetic waves of dissimilar frequencies, operates with symmetrical and/or asymmetrical duration of interruption and operation time and with any kind of composition of symmetrical and/or asymmetrical duration, of interruption and operation time and the change of their intensity until it becomes zero with any simple or composite form of pulsations. The time of interruption of each emission of specified frequency of electromagnetic waves and/or of synthetic emission, can get any value in the scale of time from 1 picosecond until 20 seconds, preferably 1 microsecond up to a maximum of 2 seconds and the operation time of each emission, of specified frequency of electromagnetic waves and/or of synthetic emission, can get any value in the scale of time from 1 femptosecond until 5 seconds, preferably 1 microsecond up to a maximum of 0,5 seconds.

The electromagnetic wave emissions of dissimilar frequencies, calculated at 1 Hz, can have the same output power or output power with small variations. For

example, the output characteristics of three devices for the application of the method are mentioned below:

A: device for the application of the method with frequency range 100 KHz – 2 GHz, Output power of 40 dBm, dBm/Hz -53, and flatness (dB) ±2.5.

B: device for the application of the method with frequency range 1 GHz – 3 GHz, Output power of 40 dBm, dBm/Hz -53, and flatness (dB) ±1.5.

C: device for the application of the method with frequency range 6 GHz – 10 GHz, Output power of 40 dBm, dBm/Hz -56, and flatness (dB) ±2.

The effects of the work on the tobacco of every quality or on its completed products, is exceptionally satisfying, when for the application of the method, an abundance of emissions of electromagnetic waves of dissimilar frequencies is used, occupying in the way mentioned above, the entire broader frequencies range of the electromagnetic spectrum, from 30 Hz to 300 GHz.

The intensity magnitudes of emissions of electromagnetic waves of dissimilar frequencies are the same or with small differences and bring about the desired results by maintaining their output power at low levels, so as not to lead to a measurement possibility of the increase in the temperature of the tobacco or tobacco products.

The effects of the work on the tobacco of every quality or on its completed products, is also satisfying, when the application of the method uses an abundance of emissions of electromagnetic waves of dissimilar frequencies, occupying in the way mentioned above, a broad part or parts of frequencies of the electromagnetic spectrum, from 30 Hz to 300 GHz, with same or different output power.

For example, a device emitting an abundance of electromagnetic waves of dissimilar frequencies and occupies the range of frequencies of the electromagnetic spectrum from 50 Hz to 100 KHz, with output power of 50 dBm and/or a device emitting an abundance of electromagnetic waves of dissimilar frequencies and occupies the range of frequencies of the

electromagnetic spectrum from 150 KHz to 1500 MHz, with output power of 47 dBm and/or a device emitting an abundance of electromagnetic waves of dissimilar frequencies and occupies the range of frequencies of the electromagnetic spectrum from 900 MHz to 10 GHz, with output power of 40 dBm and/or a device emitting an abundance of electromagnetic waves of dissimilar frequencies and occupies the range of frequencies of the electromagnetic spectrum from 2GHz to 30 GHz, with output power of 40 dBm.

It is preferable for reasons of easiness in the utilization of the electronic and/or electromechanical technology to use for the application of the method an abundance of emissions of electromagnetic waves of different frequencies covering a part or parts or even the entire range of frequencies of the electromagnetic spectrum from 30Hz to 50GHz.

The work of the method's application becomes more effective as to the time of its completion, when more than one synthetic emissions of electromagnetic waves of different frequencies are simultaneously emitted at the same space which is occupied by the mass of tobacco of every quality or of its completed products.

The method can be applied by means of one mechanism at least, which, during its operation, emits a synthetic emission consisting of a specified and/or unspecified multitude of emissions of electromagnetic waves of different frequencies.

The method can be applied also with more mechanisms operating simultaneously and/or not simultaneously and that each mechanism emits, with same or different intensity, a specified and/or unspecified multitude of emissions of electromagnetic waves of different frequencies and/or same frequencies as the other mechanisms.

In addition, the synthetic emission that consists of a multitude of emissions of electromagnetic waves of different frequencies as a total and each electromagnetic wave emission of specified frequency may be modulated with

any modulation technique, such as, for example, Frequency Modulation (FM), Amplitude Modulation (AM), Pulse Code Modulation (PCM), Binary Phase Shift Keying (BPSK), Quadrature Phase Shift Keying (QPSK), Off-set Quadrature Phase Shift Keying (OQPSK), π/4 shifted-Differential-Quadrature-Phase Shift Keying (π/4-DQPSK), Frequency Shift Keying (FSK), Minimum Shift Keying (MSK) or other modulations.

One way to apply the method by utilizing electronic technology is the use of an electronic device, which can produce a composite electromagnetic emission that contains a specified and/or unspecified multitude of electromagnetic wave emissions of dissimilar frequencies, so that these emissions occupy a very broad band of frequencies of the electromagnetic spectrum from 30 Hz to 300 GHz.

By using the main characteristic of the method, which is the interrupted time operation of each emission, of electromagnetic waves with a specific frequency, and/or the change of its intensity until it becomes zero with any simple or composite form of pulsations, we construct a device for the production of the emissions in the following way:

The device consists of four units, the first of which consists of a function generator with adjustable duty cycle; for example, an adjustment at its output, will give us symmetrical square pulses at a frequency of 200 KHz.

The signal received from the output of the first unit, is directed to the second unit, which consists of an electronic circuit, that operates as a power supply switch, i.e. from its output we will take the power supply for the third unit.

The third unit consists of a free oscillator with output power of 1.5 Watt , without filters for the reduction of the produced harmonic frequencies at its output and with resonant frequency of 600 MHz. Knowing that the emission frequency of a free oscillator depends on the stability of its supply voltage, we produce a shift at its operation frequency, by interrupting its supply from the second unit (the power supply switch), so that frequency increases when voltage decreases and decreases when voltage increases. In this way, as the oscillator will operate with a periodically interrupted supply voltage, the way we adjusted it through the first and second unit, will give operation of the oscillator

with time interruptions and, at the same time, a continuous variation of the produced central frequency, including the harmonic frequencies produced by it, which finally results in the creation of a number of signals of different frequencies at a broad range of frequencies.

The output of the third unit is directed to the input of a high frequency class A broadband amplifier (RF), with operation range from 100 KHz to 3 GHz, which can amplify its input signal up to 20 Watt, and which is the fourth unit of the device. The final amplified signal from the output of the fourth unit, without filters for the reduction of the harmonic frequencies, is conveyed through a coaxial conductor to the emission antenna, where the signal is emitted in the form of a synthetic emission, consisting of an abundance of emissions of electromagnetic waves of dissimilar frequencies.

With a spectrum analyzer we can ascertain that the synthetic emission, created by these electronic circuits, has the form of white noise and occupies the frequencies areas of the electromagnetic spectrum from 150 KHz to 3 GHz.
This device for the practical application of the method mentioned herein, is suitable for the treatment of tobacco products, which occupy with their mass a volume up to a maximum of 200 m^3, yielding measurable results of beneficial modification of their physicochemical properties in a time period of 1 hour, achieving the highest level of qualitative improvement through the modification of their physicochemical properties in a time period of 48 hours.

The easy practical application of the method allows its use at a broad industrial scale, without technical or structural restrictions.

However, the above-described conditions of the application of the method are not absolute, and considering the teachings of the present invention, somebody with ordinary skill in the art would be able to determine the appropriate parameters of the emissions.

The initiation of the qualitative improvement of the industrial tobacco products occurs with the initiation of the application of the method, while the desired

application time for the achievement of a substantial improvement is short, not more than a few hours.

Also, the method may be applied even if between the emission source of the synthetic emission of electromagnetic waves of dissimilar frequencies and the industrial tobacco products there exist any material such as, cardboard, wooden boxes, concrete and metals, with the exception of conductible materials which are grounded.

The present method can be widely used by industries, handicrafts and commercial enterprises of tobacco products, and applied either during the processing of the tobacco, or during the manufacture of the products, or even to the final tobacco products after their packaging in the storage areas or after their packaging in boxes.

The method results in a substantial qualitative improvement of the industrial tobacco products, as it counters the toxic substances of solid tobacco and restricts their toxic action, thus bringing about a significant qualitative improvement of the industrial tobacco products, so that the final product used by the consumer has fewer harmful effects on his health.